UI Method to Support Knowledge Creation in Hybrid Museum Experience

Toru Tamahashi, Rentaro Yoshioka, Takayuki Hoshino
The Graduate School of Computer Science and Engineering, University of Aizu, Japan
December 22, 2021
Overview

Mainstream approach to emotion recognition

- The cause or reason for having the resulting emotion is unknown.

We focus on eliciting people's experiences through user interaction, so that people can reflect on their own experiences and gain new insights for their next actions.
Method

The Method to Support Knowledge Creation

1. **Eliciting user behavior that encourages thinking.**
   - Support the description of impressions through simple questions and selections.
   - Encourage users to organize and investigate their impressions through each selections.

2. **Recording and visualizing information in a format that allows the experience to be shared and reused.**
   - Help users to reflect on their own impressions.
   - Gain new insights by comparing your impressions with other people's impressions.
Method – User experience flow

1. Enter the museum (login)
2. Find an exhibit that matches your interests (Navigation)
3. Deepen your understanding of the exhibit (Curator’s comments)
4. Express your own ideas.
5. Learn about other people’s ideas.

UX Flow
Method - Screen transition diagram

1.0
Select an exhibit

2.0
View exhibit information

2.1

2.2

2.3
Your Impressions

Experience express Process

People’s Impressions

Complete
Method

1. Select the area of interest
   - Apparently, this was once a cooking area. I wonder what this rock was used for?

2. Select your impression of the area of interest
   - Which of these feelings do I fit into? It's so exciting to see the scenes of the past come to mind!

3. Select the strength of the impression
   - I want to know more!
Method

1. Select the area of interest
2. Select your impression of the area of interest
3. Select the strength of the impression

Based on Plutchik’s classification of eight basic emotions (Plutchik, 1980)

- interest
- joy
- trust
- surprise
- disgust
- sadness
- anger

Apparently, this was once a cooking area. I wonder what this rock was used for?

Which of these feelings do I fit into?

It's so exciting to see the scenes of the past come to mind!

I want to know more!

Users organize their own thoughts in order to fit their impressions into a limited set of selections.
1. Select the area of interest

Apparently, this was once a cooking area. I wonder what this rock was used for?

2. Select your impression of the area of interest

Which of these feelings do I fit into? It's so exciting to see the scenes of the past come to mind!

3. Select the strength of the impression

I want to know more!
Method - Experience express Process

1. Select the area of interest
   - small
   Apparently, this was once a cooking area. I wonder what this rock was used for?

2. Select your impression of the area of interest
   - middle
   Which of these feelings do I fit into? It's so exciting to see the scenes of the past come to mind!

3. Select the strength of the impression
   - large
   I want to know more!
Method - Experience express Process

1. Select the area of interest
2. Select your impression of the area of interest
3. Select the strength of the impression

Through a series of user interactions, it encourages users to observe and organize their impressions of the exhibits. It also allows for more accurate description of impressions.
Method

I guess some people have negative feelings.
Method

By comparing impressions, people can notice differences in the way they think with other people and new aspects of the exhibits.
Experiment

Objective

This experiment will be validated by experts with extensive knowledge of the viewing experience to see whether the implemented user interface is useful for the following items

1. Encouraging appreciation
2. Ease of understanding the operation
3. Deeper understanding of the exhibition
4. Ease of expressing one's impressions
Experiment

Procedure
1. The subjects used the system in a museum.
2. After that, they answered a questionnaire.
3. Each item is scored as +2 points for strong agreement and -2 points for strong rejection.

Questionnaire
• The questionnaire consisted of 11 items.
• Each item was rated on a 5-point Likert scale (1 means strongly disagree, 5 means strongly agree).
Result

<table>
<thead>
<tr>
<th></th>
<th>Q1.1</th>
<th>Q1.2</th>
<th>Q1.3</th>
<th>Q1.4</th>
<th>Q1.5</th>
<th>Q1.6</th>
<th>Q1.7</th>
<th>Q2.1</th>
<th>Q2.2</th>
</tr>
</thead>
<tbody>
<tr>
<td>subject1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>subject2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>subject3</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>subject4</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>subject5</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>subject6</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>-1</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>total</td>
<td>6</td>
<td>7</td>
<td>6</td>
<td>3</td>
<td>8</td>
<td>6</td>
<td>4</td>
<td>8</td>
<td>8</td>
</tr>
</tbody>
</table>
1. Encouraging appreciation

.| Q1.1 | Q1.2 | Q1.3 | Q1.4 | Q1.5 | Q1.6 | Q1.7 | Q2.1 | Q2.2 |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>subject1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>subject2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>subject3</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>subject4</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>subject5</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>subject6</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>-1</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>total</td>
<td>6</td>
<td>7</td>
<td>6</td>
<td>3</td>
<td>8</td>
<td>6</td>
<td>4</td>
<td>8</td>
</tr>
</tbody>
</table>

**Q1.1**: Overall, do you think it helped you to actively appreciate the exhibits?

83% of subjects answered that the application helped to encourage their appreciation.
Discussion

2. Ease of understanding the operation

Questionnaire Results

<table>
<thead>
<tr>
<th></th>
<th>Q1.1</th>
<th>Q1.2</th>
<th>Q1.3</th>
<th>Q1.4</th>
<th>Q1.5</th>
<th>Q1.6</th>
<th>Q1.7</th>
<th>Q2.1</th>
<th>Q2.2</th>
</tr>
</thead>
<tbody>
<tr>
<td>subject1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>subject2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>subject3</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>subject4</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>subject5</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>subject6</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>-1</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>total</td>
<td>6</td>
<td>7</td>
<td>6</td>
<td>3</td>
<td>8</td>
<td>6</td>
<td>4</td>
<td>8</td>
<td>8</td>
</tr>
</tbody>
</table>

Q1.2: Was it easy for you to refer to the "impressions of others" in the application function?

Q1.5: Was it easy for you to express your impressions using the app function?

Q1.2 was answered positively by 83% of the subjects.

Q1.5 was answered positively by all subjects.

It can be said that the operation of the user interface was easy enough to understand.
## Discussion

### 3. Deeper understanding of the exhibition

<table>
<thead>
<tr>
<th></th>
<th>Q1.1</th>
<th>Q1.2</th>
<th>Q1.3</th>
<th>Q1.4</th>
<th>Q1.5</th>
<th>Q1.6</th>
<th>Q1.7</th>
<th>Q2.1</th>
<th>Q2.2</th>
</tr>
</thead>
<tbody>
<tr>
<td>subject1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>subject2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>subject3</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>subject4</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>subject5</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>subject6</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>-1</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>total</td>
<td>6</td>
<td>7</td>
<td>6</td>
<td>3</td>
<td>8</td>
<td>6</td>
<td>4</td>
<td>8</td>
<td>8</td>
</tr>
</tbody>
</table>

Q1.3: Did the ability to refer to the "impressions of others" in the app function help you to deepen your interest in the exhibits?

Q1.6: Did you find it useful to use the app to express your impressions to deepen your interest in the exhibits?

Q1.3: 83% of the subjects answered that it helped them to deepen your interest in the exhibits.

Q1.6: 66% of the subjects answered that it helped them to deepen your interest in the exhibits.

The majority of subjects felt that it helped them to deepen their interest, but some subjects felt that it did not help them enough to express their impressions.
## Discussion

### 4. Ease of expressing one's impressions

<table>
<thead>
<tr>
<th></th>
<th>Q1.1</th>
<th>Q1.2</th>
<th>Q1.3</th>
<th>Q1.4</th>
<th>Q1.5</th>
<th>Q1.6</th>
<th>Q1.7</th>
<th>Q2.1</th>
<th>Q2.2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>subject1</strong></td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td><strong>subject2</strong></td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><strong>subject3</strong></td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><strong>subject4</strong></td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td><strong>subject5</strong></td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td><strong>subject6</strong></td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>-1</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>total</strong></td>
<td>6</td>
<td>7</td>
<td>6</td>
<td>3</td>
<td>8</td>
<td>6</td>
<td>4</td>
<td>8</td>
<td>8</td>
</tr>
</tbody>
</table>

**Q1.4:** Did the ability to refer to "other people's impressions" in the app function help you express your impression of the exhibit?

**Q1.7:** Did the application help you to express your impressions of the exhibits in the way you wanted?

Q1.4 and Q1.7: 50% of the subjects answered that they were able to express their impressions sufficiently.

It is thought that half of the subjects did not feel that they were able to express their impressions sufficiently.
Conclusion

The main points of the method proposed in this study are as follows.

1. Simple questions and a complexity-free input interface allow users to quickly understand what they need to do to express their impressions.

2. Users entering their impressions can make them aware of the ambiguity of their own impressions and encourage them to take action to clarify them.

3. By looking at the visualized impressions of others, users can understand the differences in the perspectives they focus on and how they are perceived emotionally.